DESIGN AND FARBICATION OF LABORATORY PRINTER TABLE

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ABSTRACT

In this modern era, printer is widely used in offices, homes and everywhere. There are many designs of printer table available in the market. However, all printer tables available in the market are not secured the printer because the table available is exposed for being stealing. The problem had boosted the needs of proper and secured printer table. Therefore, the objective for the thesis is to design and fabricate printer table. There are several steps taken to fabricate the project.

The project has to be design. A few designs have been made based on the design criteria. The concept selection has been made then continued by fabrication process. For the structural three-dimensional solid modelling of printer table was developed by using the SolidWorks engineering drawing software.

For the analysis of the final design, Solidwork Simulation Express has been used to analyse the design. The design has been break into 13 parts for static movement and used stainless steel as a material to be analysed. From the result, it shows that the material is suitable and can be continued for the next process. The fabrication process also undergoes many steps such as material marking, cutting, drilling, welding, grinding and finalizing the printer table by painting. The results of testing the project also discussed in the thesis. Finally, in conclusion the objective designing and fabricating the printer table was reached. The results can also significantly reduce the cost, improve product reliability and customer confidence.

ABSTRAK

Dalam era moden ini, pencetak digunakan secara meluas di pejabat-pejabat, rumah dan di mana-mana. Walaubagaimanapun, ke semua meja pencetak yang terdapat di pasaran tidak selamat untuk pencetak kerana meja yang sedia ada terdedah dengan kecurian. Masalah ini telah mendorong keperluan meja pencetak yang betul dan terjamin. Oleh itu, objektif untuk tesis adalah mereka bentuk dan menghasilkan meja pencetak. Terdapat beberapa langkah yang diambil untuk mereka bentuk dan menghasilkan projek.

Projek ini harus direka bentuk dahulu. Beberapa reka bentuk telah dihasilkan berdasarkan kriteria reka bentuk. Konsep pemilihan telah dibuat dan diteruskan oleh proses fabrikasi. Lukisan struktur tiga dimensi bentuk meja pencetak ini telah direka dengan menggunakan perisian lukisan kejuruteraan yang dinamakan *"SolidWorks"*. Bagi analisis reka bentuk akhir, perisian "*Solidwork Simulation Express*" telah digunakan untuk menganalisis reka bentuk.

Reka bentuk telah dibahagikan kepada 13 bahagian bagi pergerakan statik dan menggunakan keluli tahan karat untuk dianalisis. Proses fabrikasi juga telah menjalani langkah-langkah seperti menanda dan mengukur bahan, memotong, penggerudian, kimpalan, mengikir dan akhirnya mencatkan meja pencetak. Keputusan ujian projek ini juga dibincangkan dalam tesis. Akhirnya, dalam kesimpulan, objektif reka bentuk dan reka jadual pencetak telah tercapai. Keputusan juga berupaya menurunkan kos, memperbaiki kepercayaan produk dan keyakinan pelanggan.

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LIST OF SYMBOLS

kg	Kilogram
m	Meter
mm	Millimeter
Dia	Diameter
H	Height
W	Width
D	Depth
N	Newton
V	Volts

LIST OF ABBREVIATIONS

UMP	Universiti Malaysia Pahang
FKM	Fakulti Kejuruteraan Mekanikal
SMAW	Shielded Metal Arc Welding

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Nowadays, printer is one of the most important machines in our lives. People use it to print their works and other documents. Many design of printer table has been manufactured based on the customer needs. Printer table is one of the most important things in order to keep the tidiness of certain places such as, house, office and others. Thus, printer table are needed by everyone to ensure their printer neatly arranged and safe.

1.2 PROBLEM STATEMENT

In faculty of mechanical engineer in Universiti Malaysia Pahang (UMP) the printer is shared among UMP staffs because every staff's level in consist of 6 rooms is provided with one printer. In order to keep the printer safe, the printer had been placed in one of the staff room. The problem arose when the responsible staff had another commitment that had him to be attending from his office. Therefore, the responsible staff should be standby whenever any other staff at the same level need to use that printer.

To overcome the problem, the printer need to be placed somewhere outside the staff office. However this situation will expose the printer for being stolen because the lab is still accessible by outsider whenever they doing their maintenance

work. As an example, the printer that being used by staff in block 1B level ground floor had been placed in fluid lab as shown in Figure 1.1

Figure 1.1: Printer is Exposed

1.3 OBJECTIVE

The around problem regarding the case of printer in faculty of mechanical engineer in UMP had boost the need of proper and secured printer table to place the printer. Therefore, the main objective for this project is to design printer table. The table should be secured the printer and can be placed at the proper placed.

1.4 SCOPE

In order to achieve the objective, several scopes had been set up. The first scope is doing a benchmarking. The purposed of benchmark is to see the good element in a product at the market. The next scope is to set the design criteria to overcome the problem arose. Next is design concept. Design concept is the idea behind the design. It is generated based on design criteria. The purpose of concept design is to create a few design before evaluate it to be the final design. The fourth scope is final design and the last scope is fabricated the product from final design.

1.5 PROJECT PLANNING

Figure 1.2 is the flow chart of the whole Final Year Project. To start this project, an appointment with the supervisor is done to understand about the project title given and manage the schedule of weekly meeting.

Problems are then indentified and objective and scopes of the project is then fixed. Designing phase starts of by sketching few designs and models using manual sketch on A4 papers. Then, analyse the designs and choose an appropriate design to finalize. Next, propose the design to the supervisor. After that, convert the design to the three dimensional drawing using SolidWorks software.

Following up, is the survey for the materials needed. The modification is done on the design so as the model will operate better. Once receive the materials, start the fabrication of the printer table.

Fabrication starts with the cutting of the materials, welding the parts together, drilling the necessary parts, grinding, riveting, and lastly, painting the printer table.

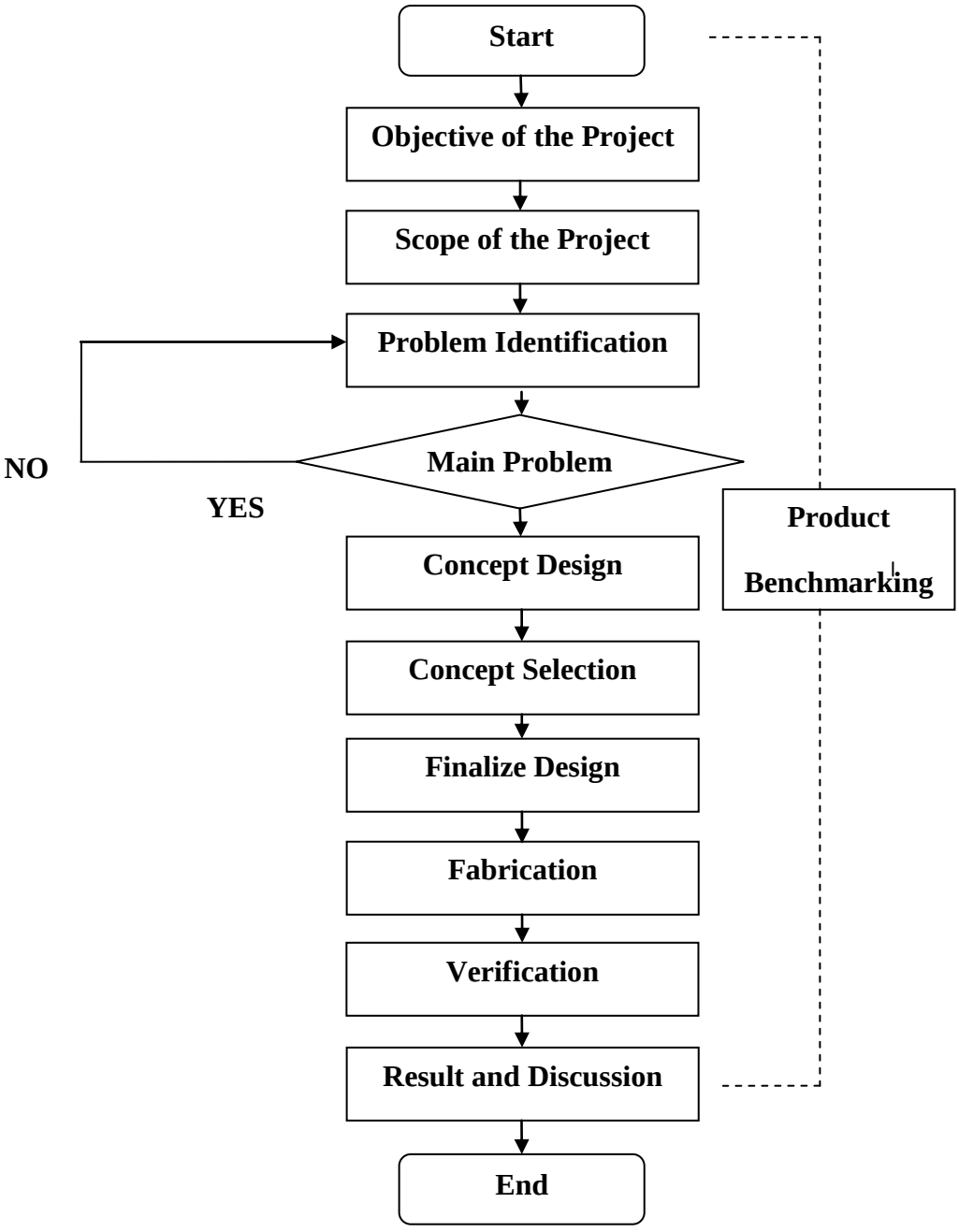

Figure 1.2: Project Flow Chart

CHAPTER 2

PRODUCT BENCHMARKING

2.1 INTRODUCTION

In this chapter, benchmark would be done, which include the printer table available in the market, the design criteria in each printer. The title design and fabrication of a printer table requires an amount of good understanding on the knowledge of the design criteria of the printer table. The information or benchmarking obtained are essentially valuable to assist in the fabrication and specification of this final year project. In this case, it is more to understanding the concept of printer table itself. Printer table available in the market would be compared and printer table simulation software would be explained.

2.2 PRINTER TABLE

Printer table is one of the most important things in order to keep the tidiness of certain places such as; house, office and others. Hence, printer table are widely manufactured in industries all over the world.

As we know, printer table are made using different materials and designated into various designs and looks. There are some printer table that are made from wood, metal, plastic and others. Printer table also are designed based on the customer suitability.

2.3 DESIGN CRITERIA

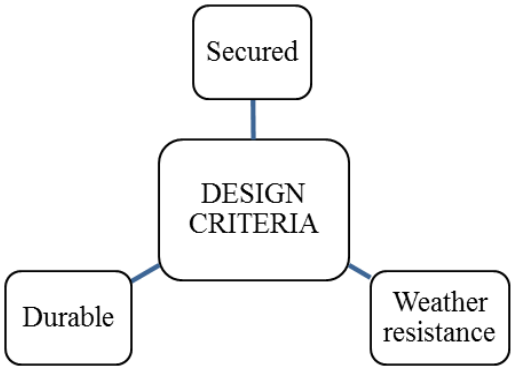

Figure 2.1: Design Criteria

From figure 2.1, the design of the table should be secured so that the printer is secured from being stolen. Next, the table should be durable so that the table can be used for a long time and the last criteria are weather resistance because the printer is going to be placed outside the fluid lab. The last criteria are to protect the printer from wet and hot condition.

2.4 PRINTER TABLE AVAILABLE IN THE MARKET

2.4.1 International Concept Mission Printer Stand

Figure 2.2: Product Review 1

Figure 2.2 shows first product review. It is made from parawood and assembled using screw. The overall dimension for this product is 24" H x 19" W x 14" D and has weight up to 10kg. Table 2.1 shows the advantages and disadvantages of the product.

Table 2.1: Advantages and Disadvantages of Product Review 1

Advantage	**Disadvantage**
durable	not suitable for outdoor
has paper tray	not secured
easily dissemble	
lightweight	

It has the criteria such as durable but not suitable to put it outdoor. Based on Spring Creek Furniture, parawood is high quality wood and durable that is produce by rubber tree. The wood is light in weight. This printer table can be folded when not in used since it assembled using screw. Even this product is light in weighted, it did not matched the main design criteria that is weather resistance. It means that if this product being used in FKM, it is exposed to bad weather since it is made from wood that can easily rotten.

2.4.2 Scoot Underdesk Printer Stand

Figure 2.3: Product Review 2

Figure 2.3 shows the 2nd product reviews. This under desk printer stand from Safco is an easy way to free up desk space. This table will accommodate most desktop printers and other small office machines. The reduced size allows it to be tucked under a desk to save space in office. The stand is also very mobile with 4 casters, and 2 of them lock to keep supplies in place when needed. This printer table has black laminate top and the steel frame is powder coated. The overall dimensions is 14.5 H x 20.5 W x 16.5 D. Table 2.2 shows the advantages and disadvantages of the product.

Table 2.2: Advantages and Disadvantages of Product Review 2

Advantage	Disadvantage
durable	not secured
has paper tray	not suitable for outdoors
powder coated	
lightweight	
save space	

This printer table is durable because the frame used steal as material and can stand from wet since it is powder coated but not secured to put it outside of the room because the printer will be exposed for being stolen. Even this product is light in weight, it did not matched the main design criteria that is weather resistance. It means that if this product being used in FKM, it is exposed to bad weather since it didn't have cover to protect the printer. Besides that, this product also not suitable for outdoors since it is design in small size for indoor use.

2.4.3 Wooden Printer Stand

Figure 2.4: Product Review 3

Figure 2.4 shows the 3rd product reviews. It is made from wood and manufactured by J&J Woodcraft. The printer stand has dimension 20 inches wide X 20 inches deep X 30 inches high and weight 25kg. Table 2.3 shows the advantages and disadvantages of the product.

Table 2.3: Advantages and Disadvantages of Product Review 3

Advantage	**Disadvantage**
durable	not suitable for outdoor
has paper tray	heavy
has aesthetic	

This printer stand is durable since it used Winsome wood as the material and not easy to carry since it weight is heavy up to 25kg. This wood is sturdy composite material and very good quality according to Amazon.Com. Even this product is durable, it did not matched the main design criteria that is weather resistance. It means that if this product being used in FKM, it is exposed to bad weather since it is made from wood that can be rotten for a longer period.

2.4.4 Iceberg Aspira Stand

Figure 2.5: Product Review 4

Figure 2.5 shows the 4th product reviews. It is manufactured by BizChair.com. It is durable and made by blow-molded high density polyethylene construction. It has good looking as any metal finish it carries the added bonus of being scratch and rust proof. The desk can be washes easily and the surface accommodates most printers 2 wire shelves for paper or small supplies. This table can supports up to 45kg. It is suitable placed in the office. Table 2.4 shows the advantages and disadvantages of the product.

Table 2.4: Advantages and Disadvantages of Product Review 4

Advantage	**Disadvantage**
durable	not suitable for outdoor
has paper tray	not secured
good looking	
scratch and rust proof	
lightweight	

Even this product is light in weight, it did not matched the main design criteria that is secured. It means this product is exposed to be stealing since it doesn't have any protection for the printer. Besides that, this product also is not suitable for outdoors since it is design in small size for indoor.

2.5 SUMMARIZE OF ALL BENCHMARKED PRODUCT

Based on the all products available in the market, all the design has the criteria such as durable for the long time used, has paper tray for customers convenient to install paper, lightweight for the easy movement to place the table and aesthetic value. The main reason why all the products are not suitable to overcome the problem is they do not have the criteria such as secured for the printer and weather resistance. All the products cannot protect the printer from being stolen since the product is exposed and bad weather. To overcome this situation, the final design should have printer cage to protect the printer from being steal and bad weather. But, the good element can be extract from the benchmarked products are durable which can support the weight of the printer and long lasting, has paper tray for people to keep papers and aesthetic value. The design concept should have this entire element so that the problem in the FKM can be solved.

CHAPTER 3

DESIGN CONCEPT AND SELECTION

3.1 INTRODUCTION

In this chapter, concept design would be done, which include a few design of printer table that has been design based on the design criteria. The title design and fabrication of a printer table requires an amount of good understanding on the knowledge of the design criteria of the printer table. The designs made are essentially valuable to assist in the fabrication and specification of this final year project. Printer table design would be compared and concept selection of the printer table would be explained.

3.2 DESIGN

The design of printer table must be compliance to several aspects. The aspects that must be considered in designing the printer table is security of the table, durability of the design, cost, and ease of design. Finally, the design of the printer table should be easy to fabricate and assemble.